Running head: VALIDATION OF BIA-R

Normative and psychometric data from the Body Image Assessment – Revised in a population of French-speaking women

Isabelle Bragard, Isabelle Mayers, Catherine Demoulin and Anne-Marie Étienne

Université de Liège

Abstract

This article concerns the creation of norms and the validation in French of the Body Image Assessment – Revised (BIA-R; Beebe, Holmbeck, & Grzeskiewicz, 1999). The sample comprised 100 normal female subjects. They completed questionnaires assessing body experience, eating pathology, psychological functioning, general perception and the BIA-R (Beebe et al., 1999). This test consists of nine silhouettes from which the subject has to choose the somatotype corresponding to her actual shape (cognitive response), the way she feels (affective response) and the way she would like to look (optative response). The results show a good concurrent validity for the cognitive and affective indices and the affective/ cognitive vs. optative divergences. On the other hand, we were not able to demonstrate such validity for the optative index and the affective vs. cognitive divergence index.

Normative and psychometric data from the Body Image Assessment – Revised in a population of young French-speaking women

The concept of body image as a psychological phenomenon was evoked for the first time by Schilder in 1935 (Slade, 1994). He defined it as the mental image of our body, considered initially as a unitary construct. Bruch (1962) was the first to recognise distortions of body image as pathognomonic indicators of anorexia nervosa. She gave the concept a perceptual connotation, although she clearly used it to recognise a variety of cognitions and attitudes toward the body (Smeets & Panhuysen, 1995). Garner and Garfinkel (1981) noted that distortions of body image could be expressed in two ways. The first is related to perception and corresponds to the degree of inaccuracy in assessing one's bodily proportions. The second involves cognitive and affective components but does not entail perceptual distortions; thus, certain patients are able to correctly assess their measurements, but dislike their bodies. The first type of disorder refers to what researchers call 'assessment of one's shape or body size', the second to the concept of 'body dissatisfaction' (Cash & Brown, 1987; Slade, 1988; Williamson, 1990). According to Garner and Garfinkel (1981), the two types may apply independently or jointly. Williamson, Davis, Goreczny and Blouin (1989b) added a third dimension to the concept of distortions of body image: the 'preference for thinness'. This is the shape that a person considers to be ideal or uses as a standard of reference when deciding whether or not she is satisfied with her body. Empirical research done in the field of distorted body image in subjects with eating disorders is based on the distinction made in the literature between the perceptual component and the optative (body preference) and cognitive-affective components of the disorder (Cash & Brown, 1987; Brodie & Slade, 1988; Gardner & Bokenkamp, 1996; Garner & Garfinkel, 1981; Smeets, 1995).

Among body image assessment techniques, perceptual techniques evaluate the accuracy with which a person judges the size of her body (Thompson, 1996). Two kinds of procedures can be used (Cash & Brown, 1987; Cash & Deagle, 1997; Gardner & Bokenkamp, 1996; Gila, Castro, Toro, & Salamero, 1998; Slade & Brodie, 1994; Thompson, 1996; Williamson, 1990): either the subject estimates the size of certain body parts (body-size estimation procedure), as for example in Askevold's (1975) image marking procedure, or she adjusts an overall image of her body (whole-image adjustment procedure). The technique involving video distortion on a life-size screen used by Probst, Vandereycken, Van Coppenolle and Pieters (1995a) is the most representative example of the latter technique. The method consists in modifying an enlarged or diminished picture of one's body until it corresponds to one's own self-image (Williamson, 1990). Similarly, the silhouette method may be seen as a variant of the whole-body evaluation method (Smeets, Smit, Panhuysen, & Ingleby, 1997). This technique involves a series of somatotypes ranging from very thin to very fat. The subject is asked to choose the silhouette that best represents her (e.g. Buree, Papageorgis, & Solyom, 1984; Fallon & Rozin, 1985; Thompson, 1996). Nevertheless, body assessment tasks do not reflect a perceptual bias alone, but can be influenced by cognitive or affective variables and by variables related to attitudes toward one's own body (e.g. Cash & Deagle, 1997; Gardner & Moncrieff, 1988; Garner & Garfinkel, 1981; Slade, 1994; Slade & Russel, 1973). Empirical research supports this point of view (Gardner & Bokenkamp, 1996; Gardner & Moncrieff, 1988; Smeets, Ingleby, Hoek, & Panhuysen, 1999; Szymanski & Seime, 1997). These authors used principles derived from signal detection theory and cognitive psychology. They found that patients with eating disorders tended to overestimate their body size in a way that was more consistent with cognitive-affective factors than with a sensory-perceptual bias, whereas this was not the case with normal subjects. These overestimates are said to be congruent with top-down perceptual models where an individual's feelings and knowledge are assumed to affect her perception (Smeets & Panhuysen, 1995).

To study the preference for thinness, researchers added an optative component to their assessment techniques. Subjects must manipulate the assessment device in order to obtain measurements or an image

that they consider to be ideal (Williamson, 1990). As for attitudinal techniques, they measure an individual's attitudes and feelings toward her own body (Thompson, 1996). Various such methods are proposed, including questionnaires and structured interviews (Cash & Deagle, 1997; Slade & Brodie, 1994; Thompson, 1990; Williamson, 1990).

This study presents normative data for the revised version of the Body Image Assessment (Beebe, Holmbeck, & Grzeskiewicz, 1999) in a population of French-speaking Belgian women. The concurrent and divergent validity of the BIA-R will also be discussed. We will examine the relationship between the BIA-R indices and scores on questionnaires assessing body experience, eating pathology and psychological functioning. These indices will also be correlated to perceptual measures.

Despite the close relationship between the cognitive and affective variables in the assessment of body image, researchers have shown that patients with eating disorders overestimate their body size more when they are asked for an affective judgement, as compared to a cognitive judgement (Bowden, Touyz, Rodriguez, Hensley, & Beumont, 1989; Huon & Brown, 1986; Proctor & Morley, 1986). We therefore chose a silhouette technique, the BIA, initially created by Williamson, Davis, Bennett, Goreczny and Gleaves (1989a) and revised by Beebe et al. (1999—BIA-R), since it is based on the distinction between cognitive, affective and optative components. Furthermore, the technique is quick, easy to use in clinical practice, and inexpensive. The BIA-R is made up of nine silhouettes[1] of women with a body size ranging from very thin to very fat. The silhouettes are about 23 cm tall and are presented on a horizontal line in the following random order (where 1 is the thinnest silhouette): 7, 2, 6, 4, 1, 9, 5, 3, 8. The subject chooses three of the nine silhouettes: 1) the first must correspond to her cognitive assessment of her size ('Which silhouette corresponds best to your size, as if you were looking in a mirror?'); 2) the second must correspond to her affective assessment of her body ('Which silhouette do you feel that you look like; what

[1] Requests for obtain the drawings of the silhouettes should be addressed to Dean Beebe, Division of Psychology, Children Hospital Medical Cente, Cincinnati, Ohio.

is your emotional assessment of your body?'); and 3) the last must correspond to the desired or optative body size ('Which silhouette corresponds to your ideal size, the one that you would prefer to have?'). The three items are presented on one page to highlight the difference between the cognitive, affective and optative assessments. This gives rise to the calculation of six indices related to these three items: the cognitive index, the affective index, the optative index and three indices of divergence, the cognitive vs. optative index, the affective vs. optative index, and the affective vs. cognitive index. A divergence measure is derived by calculating the difference between the subject's real (cognitive or affective) and ideal assessments and between cognitive and affective assessments (Altabe & Thompson, 1992).

The psychometric data for the BIA-R from a population of 104 American psychology students (Beebe et al., 1999) show a satisfactory test-retest reliability of from .63 to .79. As for concurrent validity, the authors correlated each index (affective, cognitive, optative and the divergence indices) with eating pathology measures (Bulimia Test – Revised ; Thelen, Farmer, Wonderlich, & Smith, 1991); 26-Item Eating Attitudes Test (Garner, Olmsted, Bohr, & Garfinkel, 1982), with a measure assessing 'Body Focus', i.e. the importance that a person attributes to weight or body shape (Cooper & Fairburn, 1993, cited by Beebe et al., 1999), with a measure of dissatisfaction (Body Dissatisfaction subscale of the Eating Disorders Inventory; Garner, Olmsted, & Polivy, 1983) and with measures of emotional condition (Anxiety and Depression subscales of the Profile of Mood States; McNair, Lorr, & Droppleman, 1971). Each index correlates significantly with at least three of the validation measures. Mean of the indices is 50 with a standard deviation of 10. Higher cognitive and affective BIA-R indexes, lower optative index, and higher discrepancy scores are generally associated with greater eating pathology, increased body focus, worse body dissatisfaction and more intense depressed affect. Each index score (cognitive, affective and ideal) correlates significantly with the BMI[2] reported by the subjects (Beebe et al., 1999). These data support the use of regression equations to determine norms where the numbers of the chosen silhouettes

---

2 The Body Mass Index (BMI) or Quetelet's index is the ration of weight over height squared.

are predicted by the subject's self-reported BMI. In this way, a woman's choice of cognitive, affective and ideal silhouette may be compared to statistical expectations based on her height and weight.

Method

Participants

The validation group for the Body Image Assessment – Revised (BIA-R) (Beebe et al., 1999) was made up of 100 female subjects from the general population. The subjects referred to the study were initially screened by telephone. They fell into five age groups (13–14 years old, 15–18 years old, 19–23 years old, 24–30 years old and 31–40 years old) which were empirically created. We selected women between 13 and 40 years because the prevalence of eating disorders ranges between these limits. Moreover, the majority of eating disorders patients are adolescents or young adults. So, we selected more subjects between 13 and 23 years. The average age of participants was 22.6 years old with a standard deviation of 8.01. The average BMI reported by the subjects was 20.23 with a standard deviation of 2.7; BMI varied from 16 to 32. No correlation between BMI and age group was significant. Each age group contained 20 subjects from different sociocultural backgrounds. Forty percent of subjects have a primary school level, 31% a secondary school level and 29% have a high school level. Of these participants, 73% had never married, 25% were married and 2 persons were divorced or separated. All subjects were Caucasian. The subjects could not have any mental problems or have experienced any significant fluctuation in weight recently. Pregnant women were also excluded from the study.

Materials

Main measure

Body Image Assessment – Revised (BIA-R) by Beebe et al. (1999).

Validation measures

Measures of bodily experience, eating pathology and symptoms associated with eating disorders

The Eating Disorder Inventory (EDI) (Garner, Olmstead, & Polivy, 1983) evaluates psychological and behavioural traits that are common in anorexia and bulimia by means of 64 items divided into eight subscales: 1) desire for thinness, measuring excessive preoccupation with diet and weight and the extreme pursuit of thinness; 2) bulimia, measuring the tendency to have uncontrolled binge episodes that may be followed by a compulsion to induce vomiting; 3) body dissatisfaction, measuring the dissatisfaction with the body parts that are most likely to change during puberty (hips, thighs, buttocks, etc.); 4) ineffectiveness, measuring feelings of general inadequacy, insecurity, uselessness and lack of control over one's life; 5) perfectionism, measuring excessive personal expectations of success; 6) interpersonal distrust, measuring the feeling of alienation and general aversion to any kind of close relationship; 7) awareness of internal phenomena, measuring the lack of confidence in the correct recognition and identification of one's emotions and of feelings of hunger or fullness and, 8) fear of maturity, measuring the wish to withdraw into the security of the preadolescent years due to the stringent demands of adulthood. The first three subscales evaluate attitudes and/or behaviours related to eating, weight and body silhouette, whereas the others measure fundamental features of the psychopathology of eating disorders. For each item, the subject chooses a response on a 6-point scale: 'always', 'usually', 'often', 'sometimes', 'rarely' or 'never'. The reliability and validity of the EDI have also been demonstrated by Garner et al. (1983).

The Body Attitude Test (BAT) (Probst, Vandereycken, Van Coppenolle, & Vanderlinden, 1995b) evaluates distorted subjective body experience and attitudes towards the body in patients with eating disorders. It is only used on women and includes 20 items that must be evaluated on a 6-point scale (from 0 to 5 points). The maximum score is 100; the higher the score, the more negative the body experience. The cutoff score determining the borderline between patients and the normal population was set at 36 by Probst, Vandereycken, Van Coppenolle, & Pieters (1999). Four factors were isolated:

1) negative assessment of one's body size (BAT-1) ; 2) lack of familiarity with one's own body (BAT-2); 3) general body dissatisfaction (BAT-3); and 4) a residual factor (BAT-4). The first three factors are used as subscales. The test-retest reliability and the convergent and divergent validity have been proven on a large number of patients and control subjects (Probst et al., 1995b).

Measures of psychological functioning and BMI

The Rosenberg Self-Esteem Scale (Rosenberg, 1965) evaluates overall self-esteem with 10 items. The subject chooses a response on a 4-point scale ('completely agree', 'agree', 'disagree', or 'completely disagree'). The higher the score, the greater the self-esteem. Moreover, this scale has a good construct and convergence validity (Griffiths, Beumont,, Giannakopoulos, Russell, Schotte, Thornton, et al., 1999; Rosenberg, 1965).

The Beck Depression Inventory (BDI) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) makes it possible to assess the presence and severity of depression. It is composed of 21 items presented in the form of a multiple-choice questionnaire. The higher the score, the more severe the depression. An exhaustive review of the literature on the BDI was done by Beck, Steer and Garbin (1988); it indicates that the clinical value of this tool is excellent. The test-retest reliability is higher in non-psychiatric subjects (.60 to .83) than in psychiatric subjects (.48 to .86). Finally, from the point of view of concurrent validity, the BDI correlates with other depression measurement instruments, whether in a psychiatric or a non-psychiatric population.

The Symptom Checklist-90-Revised (SCL-90-R) (Derogatis, cited by Derogatis & Lazarus, 1994) is a global self-evaluation scale of psychiatric symptoms. It is made up of 90 items that measure psychological distress through nine dimensions: 1) somatisation; 2) obsessions-compulsions; 3) interpersonal sensitivity; 4) depression; 5) anxiety; 6) hostility; 7) phobias; 8) paranoid traits; and 9) psychotic traits. The remaining items are grouped together under the term 'miscellaneous symptoms'. The subject completes the questionnaire based on what has been worrying her for the last month, and

must choose one of five possible responses: ‘no, not at all’, ‘yes, a little’, ‘yes, moderately’, ‘yes, a lot’ and ‘yes, enormously’. The test-retest reliability coefficients in this sample are very acceptable. Peveler and Fairburn (cited by Derogatis & Lazarus, 1994) illustrated excellent concurrent, predictive and construct validity for the SCL-90-R.

We also asked the subjects’ weight and height so we could calculate their BMI.

Table 1 presents internal consistencies of all the measures used in the present study. They all appear to be satisfactory.

Insert Table 1 here

Perceptual measure

A general perceptual test based on the Birmingham Object Recognition Battery (BORB; Riddoch & Humphreys, 1993) was used; we borrowed certain items from tests 2 to 5 of the BORB in order to create our perceptual matching test. The BORB was originally created to assess the visual recognition of objects by brain-damaged patients. The various tests that make up this battery are based on a functional model that describes how object recognition proceeds normally. In this model, object recognition and naming are viewed as implying access to hierarchically organised processing suites and to different kinds of stored knowledge (Riddoch & Humphreys, 1993). The four tests used in this study evaluate early, precategorial processing. The first test requires subjects to match line lengths, the second calls for them to match the sizes of circles, the third requires them to match the orientation of lines (parallel or not), and the last relies on matching the position of gaps in two circles. The items are presented in pairs and are either ‘the same’ (e.g. two lines of the same length) or ‘different’ (e.g. circles of different sizes). The trials are mixed randomly and subjects must indicate which stimuli are

the same and which are different. This test has the aim of ruling out any general perceptual problem that might be at the root of a body image disorder.

Procedure

These various measurement instruments were administered to all subjects individually. We used two different orders for the tests: either Rosenberg, BDI, SCL-90-R, EDI, BAT, general perceptual test, and BIA-R; or EDI, BAT, general perceptual test and BIA-R, ending up with the more general questionnaires, i.e. Rosenberg, BDI and SCL-90-R. The goal was to determine whether the body image tests had a bootstrapping effect on the more general tests. The questions were generally read to the subjects. The test-taking session lasted half an hour. The group was tested by two different people. The examiner-related bias was controlled for in the analysis of the results.

Results

Statistical analyses

The statistical analyses were done with the STATISTICA software. The procedures used were descriptive statistics (mean (M), standard deviation (SD), range), comparisons of means using Student's t-test for independent samples and correlations using the Bravais Pearson r coefficient of correlation. The level of uncertainty was set at 1%.

Preliminary analyses

The validation group was tested by two different people. Student t statistics revealed no significant difference between the two groups of subjects, either on the general psychopathology tests or on the specific tests for eating disorders. Thus, there is no experimenter-related bias. We also used two different orders of test-taking in order to find out whether the questionnaires concerning body image might

have a significant influence on the psychopathology questionnaires in normal subjects. The Student t statistics revealed no significant difference in the subjects' scores.

Creation of T scores

The first thing to be done was to create regression equations where the choice of silhouette was predicted by the BMI reported by participants. After various statistical operations, we obtained three final equations to convert a participant's choice of silhouette into a T score. We also calculated divergence equations for the cognitive vs. Optative, affective vs. Optative and affective vs. Cognitive responses. Conversion tables were proposed for each BIA-R index and for the divergence between indices.

Preliminary analyses

Various analyses were done before creating our regression equations. They were aimed at controlling whether the use of such equations is appropriate for the data obtained from this study. We first analyzed whether BMI is correlated with each BIA-R response, using Bravais Pearson correlations. BMI is indeed correlated with the cognitive (BIA_C: $r = 0.69$; $p < .001$), affective (BIA_A: $r = 0.59$; $p < .001$) and optative responses (BIA_O: $r = 0.47$; $p < .001$). We can therefore conclude that there is a relationship between the variables. Finally, the analysis of the three scatter plots indicates that this relationship is linear, supporting the use of regression equations.

Search for basic equations

First a regression equation was calculated for each BIA-R response, where the subject's choice of silhouette is predicted by their BMI. Thus, we obtain the following equations: for the cognitive response, $BIA_C = .42178 \times BMI - 4.283$; for the affective response, $BIA_A = .38547 \times BMI - 3.1881$; and for the optative response, $BIA_O = .174048 \times BMI - .040983$. Then, in accordance with the procedure set out by Beebe et al. (1999), we calculated the deviation between each possible choice of silhouette (observed

value) and the choice based on BMI, as a function of the regression equation (expected value). In other words, we calculated the deviation between all the choices of silhouettes participants might make (choice C, choice A and choice O) and the choice we expected they would make. We obtained residual variances ($\underline{\varepsilon}$) for which the equations are as follows: for the cognitive residuals: $\underline{\varepsilon}_C$ = (Choice C) – (.42178 x BMI – 4.283); for the affective residuals: $\underline{\varepsilon}_A$ = (Choice A) – (.38547 x BMI – 3.1881); and for the optative residuals: $\underline{\varepsilon}_O$ = (Choice O) – (.174048 x BMI – .040983). Like Beebe et al. (1999), we then wished to reduce each equation to a $\underline{Z}$ score.[3] Before doing this analysis, we proved the normality of the ε distributions with the Shapiro-Wilk W test ($\underline{\varepsilon}_C$: $\underline{W}$ = .97, $\underline{p}$ < .40; $\underline{\varepsilon}_A$: $\underline{W}$ = .98, $\underline{p}$ < .41; $\underline{\varepsilon}_O$: $\underline{W}$ = .96, $\underline{p}$ < .049). To calculate the $\underline{Z}$ scores, we subtracted from each equation the mean residual variance and divided the equation by the standard deviation for residual variation, known as the 'standard error of estimate'. Since the mean residual variance was always nil, we obtained the following $\underline{Z}$ scores: cognitive: $\underline{Z}_C$ = ((Choice C) – (.42178 x BMI – 4.283)) / 1.2122; affective: $\underline{Z}_A$ = ((Choice A) – (.38547 x BMI – 3.1881)) / 1.4151; and optative: $\underline{Z}_O$ = ((Choice O) – (.174048 x BMI – .040983)) / .8866. Finally, each equation was transformed into a $\underline{T}$ score, with a mean equivalent to 50 and a standard deviation of 10. The final equations are given in Table 2.

Insert Table 2 here

Search for divergence equations

After attributing $\underline{T}$ scores to each subject in the control group, we created the divergence equations. We first calculated the difference between the cognitive and optative $\underline{T}$ scores, the affective and

---

3 $\underline{Z}$ score = (observed value – mean for observations) / standard deviation for observations

optative T scores and the affective and cognitive T scores. We then determined the mean and standard deviation for each difference, with the aim of reducing them to Z scores. We hesitated to include the means in the equations, given the low value for these parameters; we inserted them out of a concern for accuracy. Before reducing the variables, we verified the normality of their distribution ($T_C - T_O$: $W = .97$; $p < .35$; $T_A - T_O$: $W = .98$; $p < .39$; and $T_A - T_C$: $W = .89$; $p < .00$). The affective-cognitive divergence distribution is not normal. Nevertheless, the parametric tests are less sensitive to a violation of normality when there is a large sample. Thus, we consider that we can reduce this divergence. We obtained the following Z scores: for the cognitive-optative divergence: $Z = (T_C - T_O - .003313) / 11.67009$; for the affective-optative divergence: $Z = (T_A - T_O - .000387) / 12.54855$; and for the affective-cognitive divergence: $Z = (T_A - T_C + .002926) / 6.14128$. Finally, we transformed these six equations into T scores. Table 2 sets out the divergence equations.

Creation of conversion tables

We applied the six equations to each possible value for BMI and each choice of silhouette. We obtained gross results that we rounded off to create conversion tables. The tables for the cognitive, affective, optative indices and the divergence indices are presented in Appendix A, B, C, D, E and F.

Interpretation of T-scores

We interpret the T scores in the same way as Beebe et al. (1999). Referring to the cognitive table in Appendix A, if a person reports a BMI of 20 and chooses silhouette number 4 (where 1 corresponds to the thinnest silhouette and 9 to the fattest), we give her a T score of 49. Since T scores have a mean of 50 and a standard deviation of 10, we can conclude that this woman chose a silhouette similar to that predicted, given her BMI. In fact, we consider that the T scores of the respondents do not differ from the predictions if they are between 40 and 60 (50 ± 10). On the other hand, T scores higher than 60 indicate that a respondent chose a fatter-than-expected silhouette, given her current BMI. If the person chose a

thinner-than-expected silhouette, in view of her BMI, she obtained a T score of lower than 40. With regard to the divergence measures, T scores of over 60 indicate that the person reports greater divergence than other women, between what she thinks she is and what she would like to be (for the cognitive-optative divergence), between what she feels she is and what she would like to be (for the affective-optative divergence), and between what she feels she is and what she thinks she is (for the affective-cognitive divergence). Conversely, T scores lower than 40 indicate that the respondent reports less divergence among the indices in question than other women. To conclude, T scores between 40 and 60 indicate that the person reports a divergence similar to the mean observed in control subjects. One cannot conclude that a person is correctly assessing or distorting the image of her body based on her cognitive T score. Thus, if we do not find any significant differences between two groups of subjects with regard to cognitive response, it does not mean that we can conclude that both groups are assessing their body size correctly.

Concurrent and divergent validity

This section presents the correlations between the BIA-R indices and the questionnaires concerning bodily experience, eating pathology and general psychological functioning. The correlation between the BIA-R indices and the perceptual tests from the BORB will also be presented.

Questionnaires concerning bodily experience and eating pathology

Bodily experience (EDI-DT, EDI-BD and BAT factors)

Table 3 shows that cognitive response (CR) and affective response (AR) correlate very significantly with the factors of the EDI (Drive for Thinness, DT ; Body Dissatisfaction, BD) and the attitudes toward one's body (Total BAT). They are also related to the three factors of the BAT: 'negative assessment of one's body size' (BAT-1), 'lack of familiarity with one's own body' (BAT-2) and 'general body dissatisfaction' (BAT-3). The choice of a fatter affective silhouette also entails a lesser degree of familiarity with one's body. The cognitive-optative divergence (C-O) and the affective-optative

divergence (A-O) correlate significantly with the tendency to wish to be thin. Similarly, they correlate with attitudes toward one's body; in other words, the greater the divergence between what a person thinks she is or what she feels she is and what she would like to be, the more negative her attitudes toward her own body will be. These two measures are also related to body dissatisfaction (EDI-BD) and a measure of negative assessment of one's body (BAT-1). Lastly, contrary to what appears in the literature, the optative response (OR) and the divergence between the affective and cognitive responses (A-C) do not correlate significantly with any factor assessing bodily experience, even at a level of uncertainty of 5%.

Eating pathology (EDI-B)

No significant correlation was found between the EDI factor evaluating bulimia and the BIA-R indices, which means that, in this study, bodily experience is not related to eating pathology.

Insert Table 3 here

Questionnaires concerning general psychological functioning

Significant correlations were revealed between the cognitive response and the 'awareness of internal phenomena' factor of the EDI ($r = .29$; $p < .01$). The correlation between the latter factor and the affective response was also significant ($r = .31$; $p = .001$). With regard to general psychological symptoms, a significant correlation was found between the affective index and a measure of self-esteem ($r = -.27$; $p < .01$). An unexpected correlation also appeared between the cognitive response and the hostility factor of the SCL-90-R ($r = .35$; $p < .001$). The correlation between this factor of the SCL-90-R and the affective response was also significant ($r = .29$; $p < .01$). Significant correlations were also revealed between the

cognitive-optative divergence and the 'fear of maturity' factor of the EDI (r = .25; p = .01). No other correlation was significant between BIA T scores and general psychological functioning (see Table 4).

Insert Table 4 here

Perception tests 2 to 5 from the BORB

The perceptual tasks appear to be relatively independent of the body image assessment tasks since no significant correlation appeared.

Comparative utility of the BIA-R indexes

Cognitive response is strongly correlated to affective response (r= .80; p < .001), which means that the way a person thinks she looks and the way she feels she looks are related. There is also a significant correlation between the cognitive and optative indices (r= .31; p < .01). The correlation between the affective and optative responses is significant at a level of uncertainty of 5% (r=.21; p = .035). To check which indices account for the major part of the variance of the validity measures, we used stepwise regression analysis. Discrepancy indices were not included in the analyses because there is a concern about multicollinearity. We found that the affective index of the BIA-R is the single best predictor of EDI-drive for thinness, EDI-body dissatisfaction and BAT-general body dissatisfaction (β = .45, .44 and .43, respectively; p < .01). No other index predicted a significant amount of further variability on any validation measure.

Discussion

In this study, we have described the normative development of the BIA-R on a sample of 100 female subjects, aged 13 to 40, and with BMIs of from 16 to 32. We also presented the concurrent and divergent validity of the test. Since the respondents were questioned by two different people, we made sure that this variable had no influence on the scores. Similarly, we also verified that the order in which the questionnaires were taken had no impact on performance. None of these variables had any significant effect on the subjects' scores.

The choice of a silhouette was problematic for certain subjects. In fact, in a task involving the distortion of an image on a video screen, it is the subject's actual image that is distorted. In a technique like the BIA-R, the experimenter presents each subject with nine prototypical silhouettes. Identifying with these silhouettes may be difficult because some people have a shape that does not match any one of them. Thus, certain subjects chose a silhouette on the basis of the size of the thighs, the arms or any other specific body part, whereas the goal of our study was for each person to choose a silhouette that matched her overall. For this reason, we think that a silhouette technique has less ecological validity than a video distortion task. Nevertheless, it has been found that, even with the latter technique, some subjects make their judgements as a function not of the general shape of the image presented but of certain specific features (Gardner, Morell, Watson, & Sandoval, cited by Probst, Vandereycken, Van Coppenolle, & Goris, 1992). On the other hand, we think that the silhouette technique allows a person to create a mental image of her body, without the image presented interfering with this construction. Moreover, the BIA-R technique matches better with a projective test, insofar as one asks the subject to project schemas, emotions and expectations related to her body onto prototypical silhouettes.

We also wondered about the relevance of presenting the silhouettes in random order, rather than in order of increasing size, from the thinnest to the fattest (e.g. Fallon & Rozin, 1985). Neither Williamson and colleagues nor Beebe et al. (1999) specify the reason why they chose to present the silhouettes randomly. Empirically, we could say that presenting the silhouettes in random order forces the subject to inspect each somatotype in order to choose the one that best matches herself. Presentation in increasing

order might, on the other hand, induce the person to assess herself based on the silhouette's place in the series rather than its shape. Some people found it difficult to see the differences between two silhouettes. More detailed inspection of the two somatotypes enabled them to make their choice. If the silhouettes had been placed in order of increasing (or decreasing) size, the differences would have appeared more clearly and these subjects might have chosen less well.

In this study, we tried to see whether the various BIA-R indices measure what they are supposed to measure, or whether they reflect a more general psychological dysfunction. We also tried to determine to what extent the indices predict each validation measure. The cognitive response, the affective response and the indices of divergence for the affective versus cognitive and optative responses correlate with the measures assessing emotions and attitudes toward the body, which confirms their concurrent validity. These results also confirm our hypotheses and are consistent with current theoretical research, which postulates that body image assessment indices are related to women's attitudes to their bodies (Smeets & Panhuysen, 1995; Williamson, 1996). The cognitive response correlates with affective measures and attitudes toward one's body; cognition is therefore related to emotion. This point of view has recently been set out in relation to emotional disorders by Philippot, Deplus, Schaefer, Baeyens and Falise (2001).

According to Altabe and Thompson (1993), the divergence indices may reflect different components of bodily experience. Williamson, Gleaves, Watkins and Schlundt (1993) also demonstrated that the cognitive-optative index of divergence specifically reflects a measure of body insatisfaction. Our study does not highlight such components because the cognitive-optative vs. affective-optative indices of divergence correlate with the same factors. The validity of these indices should therefore be examined with a larger range of tests measuring different components of bodily experience. However, the affective-cognitive index of divergence does not correlate significantly with any measure of bodily experience, which goes against the findings of Beebe et al. (1999). In our opinion, these results stem from the fact that the affective and cognitive indices are congruent in normal subjects, confirming Probst, Vandereycken, and Van Coppenolle 's (1997) study. However, these authors showed with a video distortion method a

clear discongruance between the cognitive and affective indices in anorexia nervosa and bulimia nervosa patients. So, before we give up this index, a study in a sample of eating disorders patients should be necessary to examine its utility. We expected that optative response correlates with EDI-DT. However, the optative response does not correlate significantly with any index (even when the correlations are considered with a level of uncertainty of 5%). It could be that EDI-DT appears to confound the measurement of dieting and fear of fatness (Gleaves, Williamson, Eberenz, Sebastian, & Barker, 1995). None of the correlations between the BIA-R indices and any measure for eating disorders is significant. These results confirm those of Altabe and Thompson (1992). Moreover, eating pathology was assessed with the 'bulimia' factor of the EDI, which only covers binges and purges. Beebe et al. (1999) approached eating pathology with the BULIT-R and EAT-26 questionnaires, which enable one to better evaluate the complexity of this phenomenon.

Despite certain significant correlations that appeared, we think that the BIA-R technique is a task that is relatively independent of other psychological variables and perceptual tests. Some results of Beebe et al. (1999) are not confirmed by our study. Those authors found significant correlations between the BIA-R indices and general psychopathological measures (more specifically, depression). They also demonstrated the validity of the optative response and the affective-cognitive divergence index. These differences between the two studies may originate in age differences within the samples. Beebe et al. (1999) used a sample of 104 American university students, whereas our sample was more heterogeneous. Social determinants may also play a role, insofar as the influence of the media may differ from one culture to another.

For more reliable benchmarking, we could have selected more subjects and according to trends in the general population. We could have taken account of the distribution of nationalities, level of education (most of the adolescent respondents were in general secondary school), the women's professions, the number of children, etc., based, for example, on the INS statistics for 1 January 2000. We also could have selected only women with a normal BMI (ranged from 20 to 25).

We asked the respondents to report their own weight. Future studies should measure the respondents' actual weight in order to avoid introducing any bias related to social desirability. In point of fact, the higher a person's weight, the more likely she is to underestimate it in her report (Koslowsky, Scheinberg, Bleich, Mark, Apter, Danon et al., 1994).

The concurrent validity of the BIA-R indices should be studied with a larger number of tests measuring attitudes and feelings toward one's body, such as the Body Shape Questionnaire (Cooper, Taylor, Cooper, & Fairburn, 1987) or the body attitude questionnaire of Ben-Tovim and Walker (1991). Such a study may make it possible to identify significant correlations between these measures and the optative index and affective-cognitive divergence, the validity of which we were unable to prove. Correlations may also appear with the cognitive vs. affective-optative divergences, revealing which aspects of bodily experience they are related to.

Conclusion

Although this study has certain limitations, it appears that the BIA-R is a valid instrument, despite the lack of concurrent validity of the optative index and the cognitive-affective index of divergence in normal subjects. Further research should address the validity of the BIA-R indices in a large sample of patients with eating disorders.

References

Altabe, M., & Thompson, J. K. (1992). Size estimation versus figural rating of body image disturbance: Relation to body dissatisfaction and eating dysfunction. *International Journal of Eating Disorders, 11,* 397-402.

Altabe, M., & Thompson, J. K. (1993). Size estimation versus figural ratings of body image disturbance: Relation to body dissatisfaction and eating dysfunction. *International Journal of Eating Disorders, 11*, 397-402.

Askevold, F. (1975). Measuring body image. *Psychotherapy and Psychosomatics, 26,* 71-77.

Beck, A. T., Steer, R. A., & Garbin, M. G. (1988). Psychometric properties of the Beck Depression inventory: Twenty-five years of evaluation. *Clinical Psychology Review, 8,* 77-100.

Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry, 4,* 561-571.

Beebe, D. W., Holmbeck, G. N., & Grzeskiewicz, C. (1999). Normative and psychometric data on the Body Image Assessment – Revised. *Journal of Personality Assessment, 73,* 374-394.

Ben-Tovim, D. I., & Walker, M. K. (1991). The development of the Ben Tovim Walker body attitude questionnaire: A new measure of women's attitude towards their own bodies. *Psychological medicine, 21,* 775-784.

Bowden, P. K., Touyz, S. W., Rodriguez, P. J., Hensley, R., & Beumont, P. J. V. (1989). Distorting patient or distorting instrument? *British Journal of Psychiatry, 155*, 196-201.

Brodie, D. A., & Slade, P. D. (1988). The relationship between body-image and body-fat in adult women. *Psychological Medicine, 18*, 623-631.

Bruch, H. (1962). Perceptual and conceptual disturbances in anorexia nervosa. *Psychosomatic Medicine, 24*, 187-194.

Buree, B., Papageorgis, D., & Solyom, L. (1984). Body image perception and preference in anorexia nervosa. *Canadian Journal of Psychiatry, 29*, 557-563.

Cash, T. F., & Brown, T. A. (1987). Body image in anorexia nervosa and bulimia nervosa: A review of the literature. *Behavior Modification, 11*, 487-521.

Cash, T. F., & Deagle, E. A. (1997). The nature and extent of body image disturbances in anorexia nervosa and bulimia nervosa: A meta-analysis. *International Journal of Eating Disorders, 22*, 107-125.

Cooper, P. J., Taylor, M. J., Cooper, Z., & Fairburn, C. G. (1987). The development and validation of the body shape questionnaire. *International Journal of Eating Disorders, 6*, 485-494.

Derogatis, L. R., & Lazarus, L. (1994). SCL-90-R, brief symptom inventory, and matching clinical rating scales. In: M. E. Maruish (Ed.), *The use of psychological testing for treatment planning and outcome assessment*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Fallon, A. E., & Rozin, P. (1985). Sex differences in perceptions of desirable body shape. *Journal of Abnormal Psychology, 94*, 102-105.

Gardner, R. M., & Bokenkamp, E. D. (1996). The role of sensory and nonsensory factors in body size estimations of eating disorder subjects. *Journal of Clinical Psychology, 52*, 3-15.

Gardner, R., & Moncrieff, C. (1988). Body image distortion in anorexics as a non-sensory phenomenon: A signal detection approach. *Journal of Clinical Psychology, 44*, 101-107.

Garner, D. M., & Garfinkel, P. E. (1981). Body image in anorexia nervosa: Measurement, theory and clinical implications. *International Journal of Psychiatry in Medicine, 11*, 263-284.

Garner, D. M., Olmsted, M. P., Bohr, Y., & Garfinkel, P. E. (1982). The Eating Attitudes Test: Psychometric features and clinical correlates. *Psychological Medicine, 12*, 871-878.

Garner, D. M., Olmsted, M. A., & Polivy, J. (1983). Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *International Journal of Eating Disorders, 2*, 15-34.

Gila, A., Castro, J., Toro, J., & Salamero, M. (1998). Subjective body image dimensions in normal and anorexic adolescents. *British Journal of Medical Psychology, 71*, 175-184.

Gleaves, D.H., Williamson, D.A., Eberenz, K.P., Sebastian, S.B., & Barker, S.E. (1995). Clarifying body-image disturbance: Analysis of a multidimensional model using structural modeling. *Journal of Personality Assessment, 64*(3), 478-493.

Gray-Little, B., Williams, V.S., & Hancock, T.D. (1997). An item response theory analysis of the Rosenberg Self-Esteem Scale. *Personality and Social Psychology Bulletin, 23*(5), 443-451.

Griffiths, R. A., Beumont, P. J. V., Giannakopoulos, E., Russell, J., Schotte, D., Thornton, C., Touyz, S. W., & Varano, P. (1999). Measuring self-esteem in eating disordered patients: The validity of the Rosenberg and Coopersmith contrasted. *International Journal of Eating Disorders, 25*, 227-231.

Huon, G. F., & Brown, L. B. (1986). Body images in anorexia nervosa and bulimia nervosa. *International Journal of Eating Disorders, 5*, 421-439.

Koslowsky, M., Scheinberg, Z., Bleich, A., Mark, M., Apter, A., Danon, Y., & Solomon, Z. (1994). Predicting actual weight from self-report data. *Educational and Psychological Measurement, 54*, 168-173.

McNair, D. M., Lorr, M., & Droppleman, L. F. (1971). *EITS manual for the profile of mood states*. San Diego, CA: Educational and Industrial Testing Service.

Philippot., P., Deplus, S., Schaefer, A., Baeyens, C., & Falise, F. (2001). Le travail émotionnel en psychothérapie: Application du modèle bi-mnésique des émotions au traitement des pathologies des émotions. *Revue francophone de clinique comportementale et cognitive, 4*, 5-18.

Probst, M., Vandereycken, W., & Van Coppenolle, H. (1997). Body size estimation in eating disorders using video distortion on a life-size screen. *Psychotherapy and Psychosomatics, 66*, 87-91.

Probst, M., Vandereycken, W., Van Coppenolle, H., & Goris, M. (1992). Body image assessment in anorexia nervosa patients and university students by means of video distortion: A reliability study. *Journal of Psychosomatic Research, 36*, 89-97.

Probst, M., Vandereycken, W., Van Coppenolle, H., & Pieters, G. (1995a). Body size estimation in eating disorder patients: Testing the video distortion method on a life-size screen. *Behaviour Research and Therapy, 33*, 985-990.

Probst, M., Vandereycken, W., Van Coppenolle, H., & Pieters, G. (1999). Body experience in eating disorders before and after treatment: A follow-up study. *European Psychiatry, 14*, 333-340.

Probst, M., Vandereycken, W., Van Coppenolle, H., & Vanderlinden, J. (1995b). The Body Attitude Test for patients with an eating disorder: Psychometric characteristics of a new questionnaire. *Eating Disorders: The Journal of Treatment and Prevention, 3*, 133-145.

Proctor, L., & Morley, S. (1986). 'Demand characteristics' in body-size estimation in anorexia nervosa. *British Journal of Psychiatry, 149*, 113-118.

Riddoch, M. J., & Humphreys, G. W. (1993). *Birmingham Object Recognition Battery (BORB)*. Hove: Lawrence Erlbaum Associates.

Rosenberg, M. (1965). *Society and adolescent self-image*. Princeton, NJ: Princeton University Press.

Slade, P. D. (1988). Body image in anorexia nervosa. *British Journal of Psychiatry, 153* (suppl. 2), 20-22.

Slade, P. D. (1994). What is body image? *Behavior Research and Therapy, 32,* 497-504.

Slade, P. D., & Brodie, D. (1994). Body image distortion and eating disorder: A reconceptualisation based on the recent literature. *European Eating Disorders Review, 2,* 32-46.

Slade, P., & Russel, G. (1973). Awareness of body dimensions in anorexia nervosa: Cross-sectional and longitudinal studies. *Psychological Medicine, 3,* 188-199.

Smeets, M. A. M. (1995*). Body size estimation research in anorexia nervosa: Breaking the deadlock.* Utrecht: ISOR.

Smeets, M. A. M., Ingleby, J. D., Hoek, H. W., & Panhuysen, G. E. M. (1999). Body size perception in anorexia nervosa: A signal detection approach. *Journal of Psychosomatic Research, 46,* 465-477.

Smeets, M. A. M., & Panhuysen, G. E. M. (1995). What can be learned from body size estimation? It all depends on your theory. *Eating Disorders, 3,* 101-114.

Smeets, M. A. M., Smit, F., Panhuysen, G. E. M., & Ingleby, J. D. (1997). The influence of methodological differences on the outcome of body size estimation studies in anorexia nervosa. *British Journal of Clinical Psychology, 36,* 263-277.

Szymanski, L. A., & Seime, R. J. (1997). A re-examination of body image distortion: Evidence against a sensory explanation. *International Journal of Eating Disorders, 21,* 175-180.

Thelen, M. H., Farmer, J., Wonderlich, S., & Smith, M. (1991). A revision of the Bulimia Test: The BULIT-R. *Psychological Assessment, 3*, 119-124.

Thompson, J. K. (1990). *Body image disturbance: Assessment and treatment*. New York: Pergamon Press.

Thompson, J. K. (1996). *Body image, eating disorders, and obesity: An integrative guide for assessment and treatment.* Washington, DC: American Psychological Association.

Williamson, D. A. (1990). *Assessment of eating disorders: Obesity, anorexia and bulimia nervosa*. New York: Pergamon Press.

Williamson, D. A. (1996). Body image disturbance in eating disorders: A form of cognitive bias? *Eating Disorders, 4*, 47-58.

Williamson, D. A., Davis, C. J., Bennett, S. M., Goreczny, A. J., & Gleaves, D. H. (1989a). Development of a simple procedure for assessing body image disturbances. *Behavioral Assessment, 11*, 433-446.

Williamson, D. A., Davis, C. J., Goreczny, A. J., & Blouin, D. C. (1989b). Body-image disturbances in bulimia nervosa: Influences of actual body size. *Journal of Abnormal Psychology, 98*, 97-99.

Williamson, D.A., Gleaves, D.H., Watkins, P.C., & Schlundt, D.G. (1993). Validation of self-ideal body size discrepancy as a measure of body dissatisfaction. *Journal of Psychopathology and Behavioral Assessment*, 15, 57-68.

Tables

Table 1: Internal consistencies (Cronbach alpha) of the all measures.

Table 2: Equations for conversion into T-scores.

Table 3: Bravais Pearson correlations between the BIA-R indices and the questionnaires concerning bodily experience and eating disorders.

Table 4: Bravais Pearson Correlations between the BIA-R Indices and measures of general psychological functioning.

Table 1

Internal consistencies (Cronbach alpha) of the all measures

Mesures de validité	α de Cronbach	References
EDI-desire for thinness	.85	
EDI-bulimia	.83	
EDI-body dissatisfaction	.91	
EDI-ineffectiveness	.86	
EDI-perfectionism	.73	Garner, Olmstead, & Polivy (1983)
EDI-interpersonal distrust	.76	
EDI-awareness of internal phenomena	.66	
EDI-fear of maturity	.65	
BAT-1	.88	
BAT-2	.90	Probst, Vandereycken, Van Coppenolle, & Vanderlinden (1995b)
BAT-3	.88	
BAT-total	.93	
Rosenberg	.88	Gray-Little, Williams, & Hancock (1997)
Beck Depression Inventory	.73 to .92	Beck, Steer and Garbin (1988)
SCL-90-R- somatisation	.88	
SCL-90-R-obsessions-compulsions	.87	
SCL-90-R-interpersonal sensitivity	.84	
SCL-90-R-depression	.90	
SCL-90-R-anxiety	.88	Horowitz, Rosenberg, Baer, Ureno, & Villasenor (1988)
SCL-90-R-hostility	.85	
SCL-90-R-phobias	.89	
SCL-90-R-paranoïd traits	.79	
SCL-90-R-psychotic traits	.80	

Note. EDI = Eating Disorders Inventory; BAT = Body Attitude Test total; BAT-1 = Body Attitude Test-Negative Assessment of one's Body Size subscale; BAT-2 = Body Attitude Test-Lack of Familiarity with one's own Body subscale; BAT-3 = Body Attitude Test-General Body Dissatisfaction subscale; SCL-90-R = Symptom Check List-90-Revised.

Table 2

Equations for Conversion into T-Scores

Index	Final equation
Cognitive	$\underline{T}_C$ = ((Choice C) – (.42178 x BMI – 4.283)) / 1.212 x 10 + 50
Affective	$\underline{T}_A$ = ((Choice A) – (.38547 x BMI – 3.188)) / 1.415 x 10 + 50
Optative	$\underline{T}_O$ = ((Choice O) – (.17405 x BMI – .041)) / .887 x 10 + 50
Cognitive-optative divergence	$\underline{T}$ = ($\underline{T}_C$ – $\underline{T}_O$ – .003313) / 11.67009 x 10 + 50
Affective-optative divergence	$\underline{T}$ = ($\underline{T}_A$ – $\underline{T}_O$ – .000387) / 12.54855 x 10 + 50
Affective-cognitive divergence	$\underline{T}$ = ($\underline{T}_A$ – $\underline{T}_C$ + .002926) / 6.14128 x 10 + 50

Note. BMI = body mass index. Routine clinical T scores can be more easily obtained using the Appendixes.

Table 3

Bravais Pearson Correlations between the BIA-R Indices and the Questionnaires concerning Bodily Experience and Eating Disorders

BIA-R index	EDI-DT	EDI-BD	EDI-B	BAT	BAT-1	BAT-2	BAT-3
Cognitive	.25**	.42***	-.00	.38***	.42***	.25**	.32***
Affective	.37***	.49***	.07	.49***	.51***	.31**	.40***
Optative	–.1	.02	.06	.04	–.08	.13	.13
Cognitive-optative discrepancy	.33***	.35***	–.04	.32***	.42***	.14	.18
Affective-optative discrepancy	.41***	.39***	.04	.38***	.47***	.18	.24
Affective-cognitive discrepancy	.19	.09	.13	.15	.13	.07	.11

Note. BIA-R = Body Image Assessment-Revised; EDI-DT = Eating Disorders Inventory-Drive for Thinness subscale; EDI-BD = Eating Disorders Inventory-Body Dissatisfaction subscale; EDI-B = Eating Disorders Inventory-Bulimia subscale; BAT = Body Attitude Test total; BAT-1 = Body Attitude Test-Negative Assessment of one's Body Size subscale; BAT-2 = Body Attitude Test-Lack of Familiarity with one's own Body subscale; BAT-3 = Body Attitude Test-General Body Dissatisfaction subscale

** $p < .01$, *** $p < .001$

Table 4

Bravais Pearson Correlations between the BIA-R Indices and measures of general psychological functioning

	BIA-R Cognitive	BIA-R Affective	BIA-R Optative	BIA-R Cogn-optat.	BIA-R Aff.-optative	BIA-R Aff.-cognit.
Rosenberg	r = -.18	r = -.27	r = -.07	r = -.12	r = -.18	r = -.11
	p = .071	p = .007*	p = .51	p = .22	p = .07	p= .29
BDI	r = .05	r = .05	r = -.03	r = .08	r = 0.09	r = .04
	p = .59	p = .58	p= .78	p = .043	p = .37	p = .70
SCL90 R	r = .09	r = .16	r = .03	r = .07	r = .12	r= .13
Somatisation	p = .35	p = .11	p= .77	p = .50	p = .21	p = .19
SCL90 R	r = .14	r = .13	r = .17	r = -.01	r = -.01	r = -.01
Obs.-comp.	p = .16	p = .20	p = .08	p = .87	p= .90	p = .96
SCL90 R	r = .13	r = .05	r = .09	r = .06	r = .00	r = -.11
inter. sens.	p = .20	p = .61	p = .36	p = .55	p = .97	p = .27
SCL90 R	r = .14	r =.08	r = .17	r = -.02	r =-.06	r = -.07
depression	p = .17	p = .44	p = .10	p = .83	p = .56	p = .50
SCL90 R	r = .10	r = .08	r = .11	r =.01	r =.01	r = .02
anxiety	p = .32	p = .42	p = .27	p = .91	p = .91	p = .88
SCL90 R	r = .35	r = .29	r = .19	r = .16	r = .10	r = -.11
hostility	p = .000**	p = .004*	p = .06	p = .10	p = .34	p = .28
SCL90 R	r = .13	r = .10	r = .03	r = .10	r = .07	r = -.02
phobias	p = .19	p= .32	p = .77	p = .32	p = .47	p = .80
SCL90 R	r = .03	r = -.04	r = .01	r = .02	r = -.03	r= -.08
paranoid traits	p = .77	p = .72	p = .90	p = .85	p = .78	p = .40
SCL90 R	r = .10	r = .10	r = .02	r = .08	r = .08	r = .01
Psychotic traits	p = .30	p = .30	p = .82	p = .41	p = .41	p = .89
EDI-ineffectiveness	r = .19	r = .18	r = -.05	r = .24	r = .21	r = -.02
	p = .06	p = .08	p = .64	p = .02	p = .03	p = .80
EDI-perfectionism	r = .06	r = .13	r = .02	r = .05	r = .10	r = .13
	p = .55	p = .21	p = .82	p = .66	p = .32	p = .20
EDI-interpersonal distrust	r = .09	r = .03	r= .02	r = .09	r = .04	r = -.08
	p = .35	p = .73	p = .81	p = .38	p = .69	p = .41
EDI-awareness of internal phenomena	r = .29	r = .31	r = .05	r = .23	r = .23	r = .03
	p = .004*	p = .001**	p = .61	p = .02	p = .02	p = .74
EDI-fear of maturity	r = .20	r = .11	r = -.10	r = .25	r = .18	r = -.15
	p = .05	p = .26	p = .36	p = .01*	p = .07	p = .13

Note. BIA-R = Body Image Assessment-Revised; BDI = Beck Depression Inventory; SCL 90 R obs.-comp. = Symptom Check List-90-Revised Obsessions-compulsions subscale; SCL 90 R inter. sens. = Symptom Check List-90-Revised Interpersonal sensitivity subscale; EDI = Eating Disorders Inventory; * $p < .01$, *** $p < .001$

APPENDIX A

Cognitively Based BIA-R T Scores Based on the Test Taker's Silhouette Choice and BMI

	Cognitive Choice of a Silhouette								
BMI	1	2	3	4	5	6	7	8	9
14	45	53	61	70	78	86	94	103	111
16	38	46	54	63	71	79	87	96	104
18	31	39	47	56	64	72	80	89	97
20	24	32	40	49	57	65	73	82	90
22	17	25	34	42	50	58	67	75	83
24	10	18	27	35	43	51	60	68	76
26	3	11	20	28	36	44	53	61	69
28	–4	4	13	21	29	37	46	54	62
30	–11	–3	6	14	22	30	39	47	55
32	–18	–10	–1	7	15	23	32	40	48
34	–25	–16	–8	0	8	17	25	33	41

Note. BIA-R = Body Image Assessment-Revised; BMI = body mass index. Instructions: To find the appropriate T score, find the box where the subject's silhouette and BMI intersect.

APPENDIX B

Affectively Based BIA-R T Scores Based on the Test Taker's Silhouette Choice and BMI

	Affective Choice of a Silhouette								
BMI	1	2	3	4	5	6	7	8	9
14	41	49	56	63	70	77	84	91	98
16	36	43	50	57	64	71	78	85	93
18	31	38	45	52	59	66	73	80	87
20	25	32	39	46	53	60	68	75	82
22	20	27	34	41	48	55	62	69	76
24	14	21	28	35	42	50	57	64	71
26	9	16	23	30	37	44	51	58	65
28	3	10	17	25	32	39	46	53	60
30	–2	5	12	19	26	33	40	47	54
32	–8	–1	7	14	21	28	35	42	49
34	–13	–6	1	8	15	22	29	36	44

Note. BIA-R = Body Image Assessment-Revised; BMI = body mass index. Instructions: To find the appropriate T score, find the box where the subject's silhouette and BMI intersect.

APPENDIX C

Optatively Based BIA-R T Scores Based on the Test Taker's Silhouette Choice and BMI

	Optative Choice of a Silhouette								
BMI	1	2	3	4	5	6	7	8	9
14	34	46	57	68	79	91	102	113	124
16	30	42	53	64	75	87	98	109	121
18	26	38	49	60	72	83	94	105	117
20	22	34	45	56	68	79	90	101	113
22	19	30	41	52	64	75	86	98	109
24	15	26	37	48	60	71	82	94	105
26	11	22	33	45	56	67	78	90	101
28	7	18	29	41	52	63	74	86	97
30	3	14	25	37	48	59	71	82	93
32	–1	10	21	33	44	55	67	78	89
34	–5	6	18	29	40	51	63	74	85

Note. BIA-R = Body Image Assessment-Revised; BMI = body mass index. Instructions: To find the appropriate T score, find the box where the subject's silhouette and BMI intersect.

APPENDIX D

Cognitive-Optative Discrepancy BIA-R T scores Based on Cognitive and Optative T scores

	Cognitive T Score									
Optative T Score	10	20	30	40	50	60	70	80	90	100
10	50	59	67	76	84	93	101	110	119	127
20	41	50	59	67	76	84	93	101	110	119
30	33	41	50	59	67	76	84	93	101	110
40	24	33	41	50	59	67	76	84	93	101
50	16	24	33	41	50	59	67	76	84	93
60	7	16	24	33	41	50	59	67	76	84
70		7	16	24	33	41	50	59	67	76
80			7	16	24	33	41	50	59	67
90				7	16	24	33	41	50	59
100					7	16	24	33	41	50

Note. BIA-R = Body Image Assessment-Revised; BMI = body mass index. Instructions : To find the T score for the divergence, find the box where the cognitive and optative T scores intersect.

APPENDIX E

Affective-Optative Discrepancy BIA-R T Scores Based on Affective and Optative T scores

	Affective T Score									
Optative T Score	10	20	30	40	50	60	70	80	90	100
10	50	58	66	74	82	90	98	106	114	122
20	42	50	58	66	74	82	90	98	106	114
30	34	42	50	58	66	74	82	90	98	106
40	26	34	42	50	58	66	74	82	90	98
50	18	26	34	42	50	58	66	74	82	90
60	10	18	26	34	42	50	58	66	74	82
70	2	10	18	26	34	42	50	58	66	74
80		2	10	18	26	34	42	50	58	66
90			2	10	18	26	34	42	50	58
100				2	10	18	26	34	42	50

Note. BIA-R = Body Image Assessment-Revised; BMI = body mass index. Instructions: To find the T score for the divergence, find the box where the affective and optative T scores intersect.

APPENDIX F

Affective-cognitive Discrepancy BIA-R T Scores Based on Affective and Cognitive T Scores

	Affective T Score									
Cognitive T Score	10	20	30	40	50	60	70	80	90	100
10	50	66	83	99	115	131	148	164	180	197
20	34	50	66	83	99	115	131	148	164	180
30	17	34	50	66	83	99	115	131	148	164
40	1	17	34	50	66	83	99	115	131	148
50		1	17	34	50	66	83	99	115	131
60			1	17	34	50	66	83	99	115
70				1	17	34	50	66	83	99
80					1	17	34	50	66	83
90						1	17	34	50	66
100							1	17	34	50

Note. BIA-R = Body Image Assessment-Revised; BMI = body mass index. Instructions: To find the T score for the divergence, find the box where the affective and cognitive T scores intersect.